

# Infectious Disease

# Infectious Disease

- Invasion of body by organism
  - Virus
    - must invade host cell to reproduce
    - can not survive outside host cell
  - Bacteria
    - self-reproducing without host cell
    - endotoxins and exotoxins often most harmful
  - Fungi
    - Protective capsules surround the cell wall and protect from phagocytes
  - Protozoa

# Infectious Disease

- Infectious diseases affect entire populations of humans
- Consider
  - needs of patient
  - potential consequence on public health
  - consequences of person-to-person contacts with family members, friends

# Communicable Disease

Infectious disease transmissible  
from one person to another

# Communicable Disease

- Agent
- Reservoir
  - Living or non-living place where agent resides
  - May not produce symptoms
- Portal of exit
  - Route for agent to leave one host to infect another host

# Communicable Disease

- Route of Transmission
  - Direct
  - Indirect
  - Airborne (droplets)
  - Vectors
  - Vehicles

# Communicable Disease

- Portal of entry
  - mechanism of entry into new host
  - exposure does not always equal infection
- Host susceptibility
  - Age, gender
  - General health, immune status
  - Cultural behaviors
  - Sexual behaviors

# Communicable Disease

- Manifestation of clinical disease dependent upon:
  - Degree of pathogenicity
  - Dose of infectious agent
  - Resistance of host
  - Correct mode of entry
- All must exist to create risk
- Exposure does not mean person will become infected

# Communicable Disease

- Latent Period
  - period after infection of a host when infectious agent cannot be transmitted to another host
  - clinical symptoms may be manifested
- Communicable Period
  - period after an infection when agent can be transmitted to another host
  - clinical symptoms may be manifested
- Incubation Period
  - time between exposure and first appearance of Sx

# Communicable Disease

- Disease Period
  - time between first appearance of Sx and resolution of Sx
  - resolution does not mean agent is destroyed
- Window Phase
  - period after infection in which antigen is present but no antibodies are detected

# Defense Mechanisms

- Skin
- Respiratory system
- Normal flora
- GI/GU systems
- Inflammatory Response
- Humoral immunity
- Cell-mediated immunity
- Nonspecific effector cells
- Reticuloendothelial System
- Complement system

# Anti-Infectives

- Bacteriocidals: penicillins, cephalosporins, Vancomycin, Bacitracin
- Bacteriostatics: sulfonamides (Septra, Bactrim), Gentamycin, erythromycin, Biaxin, Zithromax, Tetracycline
- Anti TB: Isoniazid, Rifampin, Ethambutol
- Antiviral: acyclovir, Zidovudine (AZT), Amantidine
- Antifungal: nystatin, fluconazole, clotrimazole
- Antiparasitic: Flagyl, Kwell, Quinine

## Antipyretics

- Acetylsalicylic acid (Aspirin)
- Acetaminophen (Tylenol®)
- Ibuprofen (Advil®, Motrin®)

## Anti-Inflammatory Agents

- Acetylsalicylic acid (Aspirin)
- Ibuprofen (Advil®, Motrin®)
- Indomethacin (Indocin®)
- Naproxen (Anaprox®, Naprosyn®)
- Ketorolac (Toradol®)
- Sulindac (Clinoril®)

# Hepatitis

- Inflammation of liver
- Produced by:
  - Infection
  - Toxins
  - Drugs
  - Hypersensitivity
  - Immune mechanisms

## Viral Hepatitis

- Types
  - Hepatitis A
  - Hepatitis B
  - Hepatitis C
  - Hepatitis D
  - Hepatitis E



# Hepatitis A

- Transmission
  - Hepatitis A virus
  - Fecal oral contact
  - Water, food-borne outbreaks
  - Blood borne (rare)
- Severity
  - mild severity, rarely serious
  - usually lasting 2-6 weeks

# Hepatitis A

- High risk populations
  - Household/sexual contacts of infected persons
  - International travelers
  - Day care center employees and children
  - Homosexually active males
  - Eating food prepared by others
    - can survive on unwashed hands for up to 4 hours

# Hepatitis A

- Incubation: 25-40 days
- 125,000 to 200,000 cases/yr (U.S.)
- 84,000 to 134,000 symptomatic cases/yr (U.S.)
- 100 deaths/yr (U.S.)
- Does not cause chronic liver disease or known carrier state

33% of Americans have evidence of past infection

# Hepatitis A

- Signs and Symptoms
  - Abrupt onset with
    - fever
    - weakness
    - anorexia
    - abdominal discomfort
    - nausea
    - darkened urine
    - possible jaundice

# Hepatitis A

- Treatment
  - Support & Preventive care
    - fluids and treatment of dehydration
    - infection control procedures
    - handwashing critically important
    - Hepatitis A vaccine now available
    - Prophylactic Ig may be administered w/ 2 weeks of exposure
    - Prophylaxis if traveling to less developed countries

# Hepatitis B

- Transmission
  - Hepatitis B virus
  - Blood borne
    - blood, saliva (tattooing, acupuncture, razors, toothbrushes)
  - Sexual
    - semen, vaginal fluids
  - Perinatal

# Hepatitis B

- High risk populations
  - Hemophiliacs
  - Dialysis patients
  - IV drug abusers
  - Health care personnel
  - Homosexually active males
  - Heterosexuals with multiple partners
  - Infants of infected mothers
- Can survive as dried, visible blood for > 7 days

# Hepatitis B

- Incubation: 42-160 days
- 140,000 to 320,000 infections/yr (U.S.)
  - 70,000 to 160,000 symptomatic cases/yr (U.S.)
  - 140 to 320 deaths/yr (U.S.)
  - 6 to 10% develop chronic hepatitis
- 5,000 to 6,000 deaths/yr from chronic liver disease, including primary liver cancer
- Chronic carrier state exists
  - 5-10% of infected become asymptomatic carriers

# Hepatitis B

- Sx/Sx
  - Within 2-3 months, gradually develop non-specific Sx
    - Anorexia
    - N/V, Fever
    - Abdominal discomfort
    - Joint pain, Fatigue
    - Generalized rashes
    - Dark urine, clay-colored stool
    - May progress to jaundice

# Hepatitis B

- Treatment & Preventive care
  - Supportive care
  - Prevention: BSI and Handwashing
  - Vaccine available
    - protective immunity develops if HBV antigen disappears and HBV antibody is present in serum
    - provide long lasting immunity, 95-98% of time

# Hepatitis C

- Transmission
  - Hepatitis C virus
  - Primarily bloodborne
  - Also sexual, perinatal
- High risk populations
  - IV drug abusers
  - Dialysis patients
  - Health care personnel
  - Multiple sex partners
  - **Homosexually active males**
  - **Transfusion before 1992**
  - **Clotting factors before 1987**

# Hepatitis C

- Transmission from household/sexual contact low
  - Health care workers: up to 10% probability of infection when exposed to infected blood
  - Chronic infection in >85% of cases
  - Chronic liver disease in 70% of cases
  - 8,000 to 10,000 deaths/yr from chronic liver disease (U.S.)
  - Leading indication for liver transplantation

**3.9 million Americans infected**  
**2.7 million chronically**

# Hepatitis C

- Sx/Sx
  - Same as Hepatitis B, less progression to jaundice
  - possible association of Hepatitis C infection with liver cancer
- Degree of postinfection immunity unknown
- High percentage of infected become carriers

# Hepatitis C

- Treatment & Preventive Care
  - Same as Hepatitis B
  - BSI, handwashing
  - Experimental treatment with alpha-interferon shown effective in 20% of cases
  - No recognized benefit from prophylactic IgG

## Hepatitis D (Delta Virus)

- Defective, requires HBV presence to replicate
  - Acquired as HBV coinfection or chronic HBV superinfection
- Increases disease severity, fulminant hepatitis risk (2 to 20%)
- Increases chronic liver disease risk (70 to 80%)
  - When virus becomes active with HBV, resulting disease extremely pathogenic

## Hepatitis D (Delta Virus)

- Transmission similar to HBV
- Most cases transmitted percutaneously
- Coinfection can be prevented by HBV vaccine
- No products exist to prevent superinfections
- Sx/Sx
  - abrupt onset with Sx/Sx like HBV infection
  - always associated with HBV infection
- Treatment and Prevention similar to HBV
  - HBV vaccine indirectly prevents HDV



# Hepatitis E

- Major cause of enterically-transmitted non-A, non-B hepatitis worldwide
- Transmission by fecal-oral route
- Person-to-person transmission uncommon
- Incubation: 15 to 60 days
- All U.S. cases have been travelers
- HBV vaccine has no effect on Hepatitis E
  - attention to potable water supply after flood waters

**No commercially available diagnostic test in U.S.**

# Hepatitis

- Safety
  - Obtain immunization (HBV, HAV)
  - Wear gloves
  - Wash hands
  - Needle precautions
  - Bag, label blood samples/contaminated linens
  - Wash blood spills (even dried) with bleach solution
  - Assess Personal behavior risks

# Tuberculosis

- Produced by bacterium
  - *Mycobacterium tuberculosis*
- Transmission
  - Inhalation
  - Organism forms spores
  - May contaminate air in closed spaces
    - prolonged exposure to active TB infected person
    - direct infection through non-intact skin possible

# Tuberculosis

- 10% of untreated infected persons develop active TB in 1 -2 years
- 90% have dormant infection (inactive) with risk of activation for life of host
- Initially affects respiratory system
  - if untreated, can spread to other organ systems
- Incubation ~ 4 - 12 weeks
  - clinical manifestation ~ 6 - 12 months after infection

# Tuberculosis

- Infection
  - initial infection referred to as primary infection
    - usually has no outward manifestation
    - may be outwardly manifested in elderly, young children and immunocompromised
  - cell-mediated immune response walls off bacteria (tubercle) and suppresses
  - bacteria are dormant but can reactivate (secondary infection)

# Tuberculosis

- Signs and Symptoms
  - Cough (productive or non-productive)
    - Purulent sputum
  - Fever, low grade
  - Night sweats
  - Weight loss
  - Fatigue
  - Hemoptysis

# Tuberculosis

- Extrapulmonary infection of:
  - Cardiovascular
    - pericardial effusion
  - Skeletal
    - affects thoracic and lumbar spine discs and vertebral bodies
  - CNS
    - subacute meningitis, granulomas in brain
  - GI/GU
    - GI tract
    - Peritoneum
    - Liver

# Tuberculosis

- Treatment and Preventive Care
  - Very low communicability
  - Identify high-risk patients and suspected active TB
    - Mask patient (and you) if active TB suspected
  - Routine TB testing of EMS personnel
  - Exposure Follow-up
    - Skin test & Repeat Skin test
    - INH prophylaxis
      - routinely in < 35 years of age with positive PPD
      - with caution > 35 in those at high risk
      - SE: paresthesias, N/V, hepatitis
  - Post-incident disinfection

# Tuberculosis

- Treatment and Preventive Care
  - Long Term Treatment usually involves a combination of several drugs
    - Isoniazid (INH)
    - Rifampin
    - Ethambutol
    - Streptomycin
    - Pyrazinamide
  - Drug resistant TB may require several of these drugs simultaneously

# Meningitis

- Inflammation of meninges secondary to infection by bacteria, virus, or fungi
- Most immediately dangerous when caused by:
  - *Neisseria meningitis*
  - *Meningococcus*

# Meningitis

- Colonizes throat. easily spread through respiratory secretions
- 2-10% of population probably carry meningococci at any one time but meninges not affected (carriers)
- Infants 6 mos - 2 yrs especially vulnerable
- Transmission
  - direct contact with respiratory secretions
  - prolonged, direct contact with respiratory droplets from nose or throat of infected persons

# Meningitis

- Signs/Symptoms
  - Rapid onset
  - Fever, Chills
  - Joint pain, Nuchal rigidity
  - Headache
  - Nausea, vomiting
  - Petechial rash progressing to large ecchymoses
  - Delirium, seizures, shock, death

# Meningitis

- Safety
  - BSI
    - Avoid contact with respiratory secretions
    - Breathing same air as patient does NOT create risk
  - Mask patient and yourself
  - If close contact or exposure occurs:
    - Prophylactic Rifampin
    - Others include minocycline, ciprofloxacin, ceftriaxone, and spiramycin

# Meningitis

- Safety
  - Wash hands frequently
  - Air out vehicle
  - Send linens to laundry
  - Immunization
    - Vaccines available for some strains
    - No current recommendations for routine vaccination for EMS personnel

# Meningitis

- Other sources
  - *Streptococcus pneumoniae*
    - Second most common cause in adults
    - Most common cause of pneumonia in adults
    - Most common cause of otitis media in children
    - Spread by droplets, prolonged contact and contact with linen soiled with respiratory discharge

# Meningitis

- Other sources
  - *Hemophilus influenza* type B
    - Same mode of transmission as for N. meningitidis
    - Before vaccine in 1981, leading cause of meningitis in children 6 mos - 3 yrs
    - Also associated with pediatric epiglottitis, sepsis



# Human Immunodeficiency Virus

- Kills T<sub>4</sub> lymphocytes
- Interferes with immune system function
- Produces acquired immunodeficiency syndrome (AIDS)

# HIV

- Transmission
  - Sexual intercourse (anal, vaginal, oral)
  - Shared injection equipment
  - Prenatal or perinatal
  - Breast-feeding after birth
  - No documented cases of transmission via saliva, tears, urine or bronchial secretions
    - virus has been found in these

# HIV

- Transmission
  - Risk of transmission by blood, blood products in U.S. is extremely low
  - Some health care worker infections due to needlestick or blood splashes
    - risk following direct and specific exposure to infected blood is estimated at 0.2-0.44%
  - Only one case of patients being infected by a health care worker
  - Reported but non-documented cases of paramedics infected

# HIV

- Epidemiology (worldwide)
  - 34.3 million HIV infected
    - 71% live in Sub-Saharan Africa
    - 16% live in South/Southeast Asia
  - 1% of the 15-49 age group infected
    - 8.6% in Sub-Saharan Africa
    - >10% in 16 African countries

# HIV

- Epidemiology (worldwide)
  - 2.8 million deaths worldwide in 1999
  - 18.8 million cumulative deaths

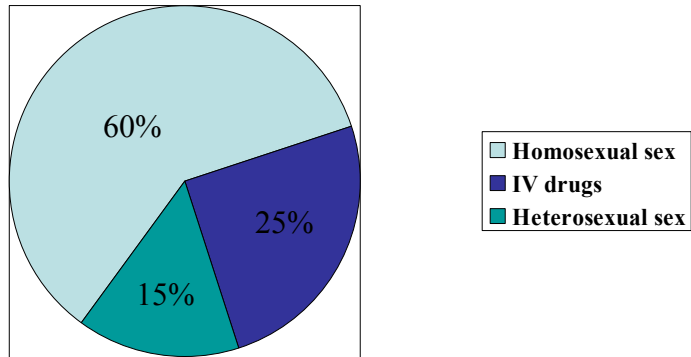
**80% of cases have resulted  
from heterosexual  
intercourse**

# HIV

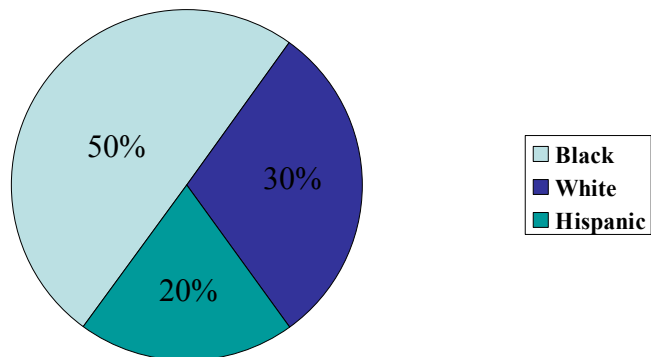
- Epidemiology (U.S.)
  - 900,000 infected (200,000 of these unaware)
  - 733,374 cases of AIDS as of 12/31/99
  - 430,411 deaths

**AIDS is the 5th leading cause of deaths  
in the U.S. for people ages 24 to 44**

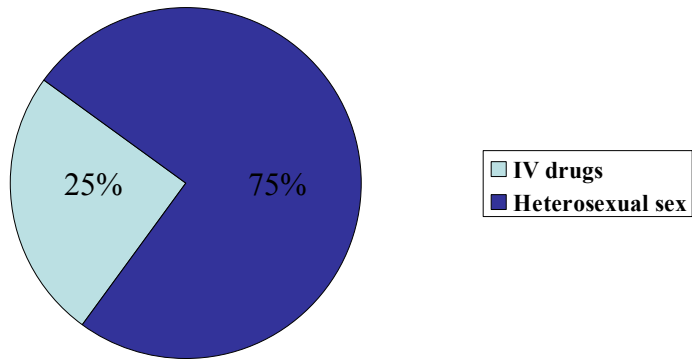
## HIV New Male Infections (U.S.)



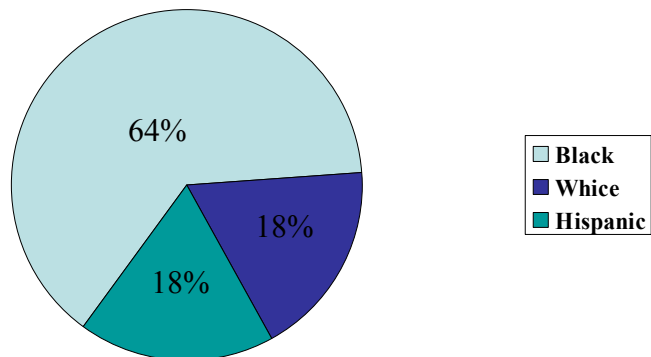
## HIV New Male Infections (U.S.)



## HIV New Female Infections (U.S.)



## HIV New Female Infections (U.S.)



# AIDS

- Virus present in all body fluids, all body tissues
- Virus spread by:
  - Blood
  - Semen
  - Vaginal fluid
  - Breast milk
  - Other body fluids containing blood
- Health care workers may be at risk from CSF, synovial fluid, and amniotic fluid

# AIDS

- Asymptomatic infection (1 to 10 years)
- About 50% of HIV-infected patients develop true AIDS within 10 years

# AIDS

- Acute Infection
  - Lasts 2 to 4 weeks
  - Symptoms
    - Fever
    - Sore throat
    - Lymphadenopathy
- Seroconversion
  - Occurs at 6 to 12 weeks

# AIDS

- AIDS - related complex (ARC)
  - weight loss > 10%
  - diarrhea for >1 month
  - fever
  - night sweats

# AIDS

- True AIDS = Life-threatening opportunistic infections
  - *Pneumocystis carini*
  - *Candida albicans*
  - Cytomegalovirus (CMV)
  - Kaposi's sarcoma

# AIDS

- *Pneumocystis carini*
  - Most common life-threatening opportunistic infection
  - Pneumonia
  - Often leads to AIDS diagnosis



# AIDS

- *Candida albicans*
  - Yeast infection
  - Called “thrush” in infants
  - Can disseminate to GI tract, bloodstream

# AIDS

- *Cytomegalovirus (CMV)*
  - Retinitis, blindness
  - Colitis
  - Pneumonitis

# AIDS

- Kaposi's sarcoma
  - Purple-brown, painless lesions
  - May enlarge, coalesce, bleed
  - Can affect internal organs



# AIDS

- Fungi
  - *Aspergillus* pulmonary infection
  - *Cryptococcus* meningitis, pulmonary infection, disseminated infection
  - *Histoplasma* disseminated infection
  - *Coccidiomyces* disseminated infection
  - *Penicillium* disseminated infection
- Viruses
  - Herpes simplex skin and visceral
  - Herpes zoster skin, ophthalmic nerve, disseminated, visceral
  - JC virus progressive multifocal leukoencephalopathy

# AIDS

- Parasites
  - *Toxoplasma* encephalitis
  - *Cryptosporidia*
  - *Isospora*
  - *Microspora*
  - *Giardia*
- Bacteria
  - *Streptococcus pneumonia*
  - *Hemophilus influenza*
  - *Nocardia asteroides*
  - *Pseudomonas aeruginosa*
  - *Rhodococcus equi*
  - *Bartonella henselae*
  - *Salmonella*
  - *Staphylococcus aureus*
  - *Treponema pallidum*

# AIDS

- Mycobacteria
  - *Mycobacterium tuberculosis*
  - *M. avium*
  - *M. kansasii*
  - *M. haemophilum*
  - *M. goodii*
  - *M. genavense*
  - *M. xenopi*
  - *M. fortuitum*
  - *M. malmoense*
  - *M. chelonae*

# AIDS

- AIDS Dementia Complex
  - Infection of CNS cells
  - Cerebral atrophy
  - Characterized by:
    - Cognitive dysfunction
    - Declining motor performance
    - Behavioral changes

# AIDS

- Safety
  - BSI
  - Wash hands between patients
  - Clean blood spills with bleach solution
  - All sharp objects potentially infective
  - Do NOT recap needles
  - Wear mask to avoid exposing patient
  - Pregnant paramedics should avoid contact with AIDS patients (risk of CMV exposure)

# AIDS

- Treatment
  - Support care
  - No immunization available
  - Post Exposure Prophylactic treatment
    - Recommended w/ 3 hours of significant exposure
    - CDC recommendations
      - zidovudine
      - lamivudine
      - indinavir
      - nelfinavir

# AIDS

AIDS is NOT airborne  
AIDS is NOT transmissible by  
insects

# Gonorrhea

- Bacterium - *Neisseria gonorrhea*
- Infection of genital or rectal mucosa
- Ocular, oral infections may occur
- Transmission
  - direct contact with exudates of mucous membranes
  - usually from unprotected sexual intercourse

# Gonorrhea

- May progress to:
  - Bacteremia
  - Pericarditis
  - Endocarditis
  - Meningitis
  - Perihepatitis

# Gonorrhea

- Signs/Symptoms
  - Males
    - Dysuria
    - Mucopurulent urethral discharge
    - Can progress to epididymitis or prostatitis
  - Females
    - May be asymptomatic
      - dysuria and purulent vaginal discharge may occur
    - Lower abdominal pain
    - Can progress to PID: fever, lower abd pain, abnormal menstrual bleeding

# Gonorrhea

- Females are at increased risk for
  - sterility
  - ectopic pregnancy
  - abscesses of fallopian tubes, ovaries or peritoneum
  - peritonitis
- Males & Females
  - septic arthritis can occur resulting in fever, pain, joint swelling, joint deterioration

# Gonorrhea

- Treatment & Preventive Care
  - BSI
  - Handwashing
  - Antibiotics for treatment of infection
  - No immunization available

# Chlamydia

- Bacterial trachomatis
- Most common STD in U.S.
- Transmission
  - Sexual contact
  - Contact with exudates, including childbirth
- Affects eyes, genital area and associated organs
- Estimated that up to 25% of men may be carriers



# Chlamydia

- Signs and Symptoms
  - Similar to gonorrhea
  - Conjunctivitis (leading cause of preventable blindness in world)
  - Infant pneumonia
- May result in infertility

# Chlamydia

- Treatment & Preventive Care
  - BSI
  - Handwashing
  - Antibiotics for treatment of infection
  - No immunization available

# Syphilis

- Produced by spirochete - *Treponema pallidum*
- Transmitted by
  - Sexual contact
  - From mother to fetus
  - Direct contact with
    - exudates from moist, early, obvious or concealed lesions of skin and mucous membranes, or semen, blood, saliva, vaginal discharges
  - blood transfusion or needlestick (low risk)
- 30% of exposures result in infection

# Syphilis

- Primary stage
  - Chancre
    - At site of entry
    - Painless ulcer
  - Regional lymphadenopathy
  - Lasts 4 to 8 weeks



# Syphilis

- Secondary stage
  - Bacteremia stage ~6 weeks after chancre healed
  - Skin lesions, rashes
  - Fever, headache, nausea, malaise
  - Begin at 6 to 12 weeks
  - Peak at 3 to 4 months
  - Lesions may reappear for up to 1 year



# Syphilis

- Latent stage
  - Begins at about 1 year
  - May last from 3 years to rest of patient's life
  - Early latent phase: < 2 years
  - Late latent phase: > 2 years
  - 1/3 of untreated patients develop tertiary syphilis within 3 to 25 year; others remain asymptomatic
  - 25% may relapse and secondary symptoms develop again

# Syphilis

- Tertiary stage
  - Lesions of skin, bone, viscera (gummas)
    - painless w/sharp borders
    - bone w/deep, gnawing pain
  - Cardiovascular syphilis
    - 10 yrs after 1<sup>o</sup> infection
    - dissecting aneurysm
  - Neurosyphilis
    - meningitis
    - loss of reflexes, pain
    - mental deterioration



# Syphilis

- Treatment and Preventive Care
  - Avoid direct contact with skin lesions
  - Patients are contagious in primary, secondary, possibly early latent stage
  - Tertiary stage is not contagious

# Herpes simplex

- Types
  - Type I: Cold sores, fever blisters,
  - Type II: Genital herpes
- Usually affect:
  - oropharynx, face, lips
  - skin, fingers, toes
  - CNS in infants

# Herpes simplex

- Transmission
  - Saliva of carriers
  - Infection on hands, fingers

# Herpes simplex

- Signs and Symptoms
  - Cold sores, fever blisters (lips, face, conjunctiva, oropharynx)
  - Burning
  - Tenderness
  - Fever
  - Lymphadenopathy
  - Vesicular lesions
    - Weep clear fluid, ulcerate
- Treated with acyclovir (Zovirax®)



# Herpes simplex

- Treatment & Preventive Care
  - BSI
    - consider mask
  - Lesions are highly contagious
  - Acyclovir (topical, IV or oral)

# Genital Herpes

- Genital herpes in female may transmit to infant at birth if open lesions present
- May be life threatening for infant



# Genital Herpes

- Caused by herpes simplex virus type 2
- Affects tissues and structures associated with intimate contact with infected person
- Transmission
  - Usually through sexual activity

# Genital Herpes

- Signs and Symptoms
  - Males
    - lesions of the penis, anus, rectum and/or mouth depending on sexual practices
  - Females
    - lesions of the cervix, vulva, anus, rectum and mouth depending on sexual practices
    - recurrent usually affects vulva, buttocks, legs, and perineal skin

## Herpes simplex

- Treatment & Preventive Care
  - BSI
  - Wash hands
  - Launder linens well
  - Acyclovir





# Measles

- Red measles, rubeola, hard measles
- Paramyxovirus
- Affects respiratory, CNS, pharynx, eyes, systemic
- Transmission
  - nasopharyngeal air droplets
  - direct contact with secretions



# Measles

- Symptoms
  - begins with:
    - conjunctivitis, swelling of eyelids, photophobia, high fever, hacking cough, malaise
  - 1 or 2 days before rash
    - small, red-based lesions with blue-white centers on buccal mucosa (Koplik's spots)
  - rash: red, maculopapular (slightly bumpy) spreading from forehead to face, neck torso and feet by the third day
    - usually lasts for 6 days

# Measles

- May progress to pneumonia, eye damage or myocarditis
- Most life-threatening is sclerosing encephalopathy
  - slowly progressing neurological disease with deteriorating mental capacity and coordination



# Measles

- Treatment & Preventive Care
  - BSI, consider mask
  - Handwashing
  - Immunization (MMR)

# Mumps

- Paramyxovirus
- Affects salivary glands and CNS
- Transmission
  - Respiratory droplets
  - Direct contact with saliva
  - 12-25 day incubation period

# Mumps

- Signs and Symptoms
  - Fever
  - Swelling
  - Tenderness of salivary glands

# Mumps

- **Complications**

- Aseptic meningitis 15%
- Orchitis 20-50% post-pubertal males
- Pancreatitis 2-5%
- Deafness 1 in 20,000
- Death 1-3/10,000

# Mumps

- **Treatment & Preventive Care**

- EMS personnel should have established MMR immunity
- BSI & Handwashing
- Apply surgical mask to patient
- MMR Immunization

# Chicken Pox

- Varicella zoster virus
- Primarily affects skin
- Transmission
  - through droplets from mucous membranes
  - direct contact with vesicle discharge
- 5,000 to 9,000 hospitalizations annually
  - 100 deaths

# Chicken Pox

- Signs and Symptoms
  - begins with respiratory sx, malaise and low-grade fever
  - Itchy rash with vesicular lesions that cover body
    - worse on trunk
- More severe form in adults
  - May cause pneumonia, disseminated infection in adults

# Chicken Pox

- Treatment & Preventive Care
  - BSI & Handwashing
  - Isolation of children from public places until lesions are crusted and dry
  - antivirals to lessen symptoms mostly in adults
  - EMS workers w/o past exposure to chickenpox may consider chickenpox vaccine
  - Varicella zoster immune globulin recommended if pregnant and with a substantial exposure

# Rubella

- German measles
- Rubivirus
- Affects skin, musculoskeletal and lymph nodes
- Transmission
  - nasopharyngeal secretions
  - maternal transmission (most concern)

# Rubella

- Signs and Symptoms
  - Upper respiratory symptoms
  - Fever
  - Maculopapular rash, fainter than measles that does not become confluent (patch)
    - spreads from forehead to face to torso and extremities and lasts 3 days

# Rubella

- Complications

– Arthritis, arthralgia	70% adult females
– Encephalitis	1/5,000 cases
– Thrombocytopenic purpura	1/3,000 cases
– Neuritis	rare
– Orchitis	rare

# Rubella

- Congenital Rubella Syndrome
  - Infection may affect all organs
  - May lead to fetal death, premature delivery
  - Infection early in pregnancy most dangerous
  - Effects related to stage of gestation at time of infection

# Rubella

## **Congenital Rubella Syndrome**

- |                 |                        |
|-----------------|------------------------|
| • Deafness      | • Microcephaly         |
| • Cataracts     | • Mental retardation   |
| • Retinopathy   | • Bone alterations     |
| • Heart defects | • Liver, spleen damage |

**Estimated Lifetime Cost > \$200,000**



# Rubella

- Treatment & Preventive Care
  - BSI, Consider mask
  - Handwashing
  - EMS personnel, especially females, should have immunity to rubella
  - Non-immunized pregnant exposed to rubella during 1st trimester at risk for fetal abnormalities
  - Immunization (MMR)
    - not recommended during pregnancy

# Pertussis (Whooping Cough)

- *Bordetella pertussis*
- Affects oropharynx
- Transmission
  - direct contact with discharges from mucous membranes contained in airborne droplets

# Pertussis (Whooping Cough)

- Signs and Symptoms
  - Cough which becomes paroxysmal in 1-2 weeks and lasts 1-2 months
  - Violent, sometimes with crowing or high-pitched inspiratory whoop
  - May end with expulsion of clear mucous and vomiting
  - Whoop may not be present in infants < 6 months or adults
  - Communicable period may be greatest before onset of cough

# Pertussis (Whooping Cough)

- Treatment & Preventive Care
  - BSI
  - Incubation period 6 - 20 days
  - Erythromycin decreases communicability and symptoms if during incubation period (before onset of coughing)
  - Immunization (DPT)
    - booster doses recommended

# Mononucleosis

- Epstein-Barr virus
- Affects oropharynx, tonsils
- Transmission
  - person-to-person spread by oropharyngeal route and saliva

# Mononucleosis

- Signs and Symptoms
  - fever
  - sore throat
  - oropharyngeal discharges
  - lymphadenopathy
  - splenomegaly
  - recovery usually occurs in a few weeks but some require months before return to full level of energy

# Mononucleosis

- Treatment and Preventive Care
  - BSI, Handwashing
  - No specific treatment
  - NSAIDS
  - No immunization

# Scabies

- Burrowing mites
- Affects skin
- Transmission
  - direct skin to skin contact
  - sexual contact
  - bedding in contact with infected person w/l past 24 hours



# Scabies

- Sx/Sx
  - Intense itching, especially at night
  - Papules (bumps) with intense itching on hands, fingers, wrists, axillae, genitalia, medial thighs
  - Males
    - lesions prominent around finger webs, anterior surfaces of wrists and elbows, armpits, belt line, thighs and external genitalia
  - Females
    - lesions prominent on nipples, abdomen, lower portion of buttocks

# Scabies

- Treatment & Preventive Care
  - BSI when handling patient and bedding
  - Treated with Kwell® or other similar agents based on patient age
  - No immunization

# Lice

- Blood sucking insects
- Types
  - Head
  - Body
  - Pubic (crab)
- Itching, white specks (nits) on hair



# Lice

- Transmission
  - Head and Body lice
    - direct contact with an infested person and objects used by them
  - Body lice
    - indirect contact with the personal belongings, especially shared clothing and headwear, of infested person
  - Crab lice
    - sexual contact with infested person
  - Fever does not favor transmission; leave febrile hosts

# Lice

- Signs and Symptoms
  - itching
  - location dependent upon infestation
  - head lice
    - itching of hair, eyebrows, eyelashes, mustache and beards
  - body lice
    - infestation of clothing especially along seams of inner clothing surfaces

# Lice

- Treatment & Preventive Care
  - BSI, Bag linen separately
  - Insecticide in ambulance effective for lice and mites
  - Personal treatment includes use of body/hair pediculicide repeated 7-10 days later

# Tetanus

- *Clostridium tetani*
- Affects musculoskeletal system
- Transmission
  - tetanus spores introduced into body through wounds or disruptions in skin
  - introduction of soil, street dust, animal or human feces
  - does not require significant wound to result in infection

# Tetanus

- Sx/Sx
  - Muscular tetany
  - Painful contractions of masseter (“lockjaw”) and neck muscles; later, trunk muscles
  - Abdominal rigidity often first sign in peds
  - Facial contortion often noted (grotesque grinning)
  - May lead to respiratory failure



# Tetanus

- Treatment and Preventive Care
  - Temporary, passive immunity from tetanus immune globulin or tetanus antitoxin
    - usually administered at childhood as DPT
  - Active tetanus immunization with a booster
    - booster generally recommended every 10 years or following potential exposure
    - booster recommended every 5 years for high risk persons like EMS personnel

# Rabies

- Lyssavirus
- Affects Nervous System
- Transmission
  - saliva containing virus transmitted after a bite or scratch from an infected animal
  - transmission person-to-person possible but has never been documented
  - Hawaii only area in US that is rabies free
  - In US, wildlife rabies common in: skunks, raccoons, bats, foxes, dogs, wolves, jackals, mongoose, and coyotes

# Rabies

- Sx/Sx
  - Onset usually by
    - Sense of apprehension
    - Headache
    - Fever
    - Malaise
  - Progresses to weakness/paralysis, spasm of swallowing muscles (results in hydrophobia), delirium and convulsions
  - W/O intervention, lasts 2-6 days
  - Death usually from respiratory failure

# Rabies

- Treatment & Preventive Care
  - BSI
  - Allow free bleeding and drainage
  - Vigorously clean wound with soap and water
  - Human Rabies immune globulin
  - Tetanus prophylaxis
  - Immunization with Human Diploid Cell Rabies vaccine or Rabies vaccine for higher risk persons
    - animal care workers, animal shelter personnel

# Infection Control Procedures

## Pre-Response

- Maintain personal health
  - Yearly general check-up
  - Nutrition/Alcohol, Drug Use
- Vaccination
  - DPT, MMR
  - Varicella
  - Hepatitis B, consider Hepatitis A
  - Influenza
- PPD test for TB every 6-12 months

# Pre-Response

- Work Area Restrictions
  - In areas where there is likelihood of exposure to blood or other infectious materials, do not eat, drink, apply cosmetics or lip balm, smoke, or handle contact lenses
  - This includes the driver's compartment of the ambulance unless it is isolated from the patient compartment
  - Protect these items from exposure while being stored in ambulance or on your person

# Pre-Response

- Don't go to work if you:
  - have diarrhea
  - have a draining wound or wet lesion
  - jaundice
  - have mononucleosis
  - have lice/scabies and have not been treated with a medication and/or shampoo
  - have been taking antibiotics for less than 24 hours for a strep throat
  - have a cold (wear a mask if you have to go to work)

## During Response

- Personal Protective Equipment
  - Gloves: whenever contact may occur with blood, other potentially infectious material, non-intact skin, mucous membranes
  - Masks, goggles: whenever splashes, spray, splatter, or droplets of blood or other potentially infectious materials can be anticipated
    - TB masks: HEPA or N95 respirators
  - Caps, hoods, resistant shoe covers: whenever gross contamination can be anticipated

## During Response

- Needles
  - Contaminated sharps are not bent, recapped, removed, sheared, or broken
  - Sharps are discarded in closeable, puncture-proof, leak-proof, labeled, color-coded containers

## Post Response

- Remove contaminated garments as soon as feasible
- Dispose of all disposable equipment in biohazard labeled receptacles
- Remove contaminated linens from vehicle, bag for laundering following agency procedures

## Post Response

**Wash Your  
Hands!!!**

## Post Response

- Disinfect non-disposable equipment immediately
  - bactericidal against TB and hepatitis
- Clean up all spills immediately
- Scrub, disinfect ambulance daily or as needed after response

**Wear gloves during all clean-ups**

**Consider wearing mask**

## Post Response

**Wash Your Hands  
Again!!!**

# Post-Exposure

- Exposure Incident
  - any specific eye, mouth, other mucous membrane, non-intact skin, parenteral contact with blood, blood products, or other potentially infectious materials
- Reporting
  - should be reported quickly
  - allows for immediate medical follow up and intervention as appropriate
  - allows for evaluation of incident and implementation of changes to prevent future occurrences

# Post-Exposure

- Reporting
  - Ryan White act requires a designated person within organization for reporting
  - Implements organization's Exposure Control Plan
- Medical Evaluation
  - Employer must provide free medical evaluation and treatment to exposed employees
    - includes counseling regarding risks, sx/sx, medication side effects, risk of developing disease



# Post-Exposure

- Evaluation
  - Often involves blood testing of exposed employee (baseline)
    - PPD testing in case of TB
  - Implement prophylactic regimens as appropriate after medical counseling
  - Follow up and repeat testing